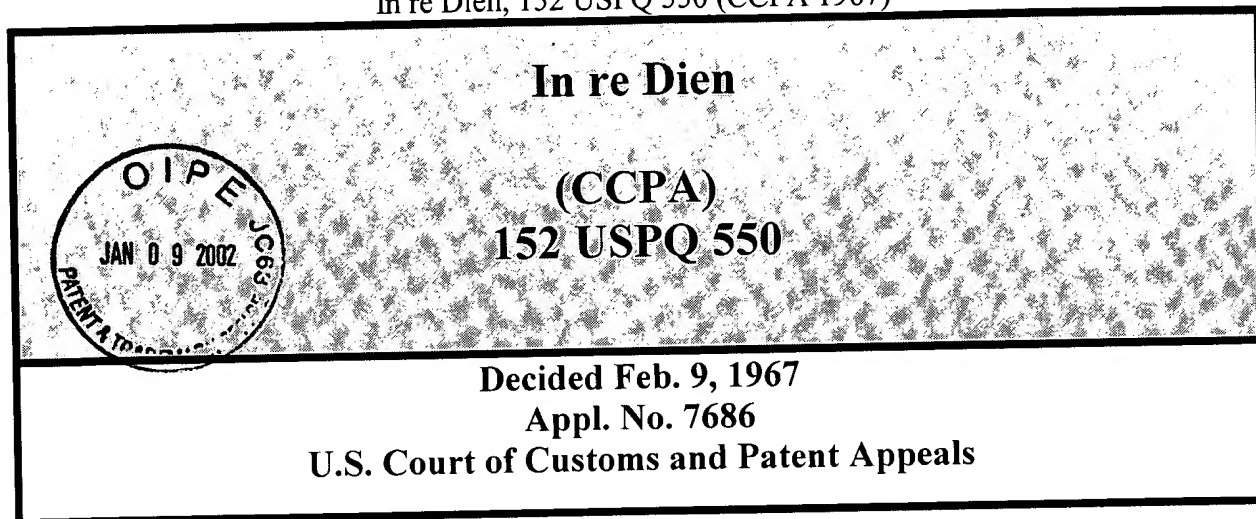


**In re Dien, 152 USPQ 550 (CCPA 1967)**



**Headnotes**

**PATENTS**

**1. Patentability - Invention - In general (§ 51.501)**

Mere existence of unsatisfactory process and the attendant incentive to seek improvement do not negative patentability; one cannot fairly infer obviousness from inadequacies of prior art; issue is whether elimination of inadequacies by means disclosed by applicant would have been obvious to one of ordinary skill.

**Particular patents-Quinacridones**

Dien, Preparation of Quinacridones, claims 1 to 19 of application allowed.

**Case History and Disposition:**

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Appeal from Board of Appeals of the Patent Office.

Application for patent of Chi K. Dien, Serial No. 64,307, filed Oct. 24, 1960; Patent Office Group 120. From decision rejecting claims 1 to 19, applicant appeals. Reversed; Smith, Judge, concurring with opinion; Worley, Chief Judge, dissenting with opinion.

**Attorneys:**

I. Harry Rosenberg, New York, N. Y., for appellant.

Joseph Schimmel (Raymond E. Martin of counsel) for Commissioner of Patents.

**Judge:**

Before Worley, Chief Judge, Rich, Smith, and Almond, Associate Judges, and Kirkpatrick, Judge. \*

**Opinion Text**

**Opinion By:**

Rich, Judge.

This appeal is from a decision of the Patent Office Board of Appeals, <sup>1</sup> adhered to on reconsideration, affirming the rejection of claims 1-19 of application serial No. 64,307, filed October 24, 1960, entitled "Preparation of Quinacridones." No claim has been allowed.

The invention is an improvement in the process of preparing quinacridones. These compounds are prepared from 2, 5-diarylamino-terephthalic acids in a condensation reaction in which two molecules of water are eliminated and two interior rings are formed. The process is known as a double ring-closure. "Ring-closing agents" may be employed. Appellant has discovered that improved ring-closure is effected by the use of polyphosphoric acid (PPA) as a ring-closing agent. The improved process is marked by very high yields (e.g., 98%), product purity and other technological conveniences.

Claim 1 is typical:

1. The improvement in the process of preparing a quinacridone by ring-closure of a 2,5-diarylamino-terephthalic compound, which comprises carrying out ring-closure of the 2,5-diarylamino - terephthalic compound with the aid of a polyphosphoric acid as a ring-closing agent.

The other claims are drawn to various modifications of the process of claim 1. Claims 11-15 include a dilution of the reaction mixture with water. Claims 5-15 and 16-19 limit the 2,5-diarylamino-terephthalic compounds to acids and esters respectively.

The examiner relied on the following references:

Struve 2,821,530 Jan. 28, 1958

DuPont (British) 805,247 Dec. 3, 1958

Liebermann, 18 Liebig's Annalen der Chemie 245-50 (1935)

Uhlig, 66 Angewandte Chemie 435-36 (1954)

Brockmann et al., 89 Berichte Deut. Chem. 1379-97 (1956)

Liebermann discloses the basic reaction. The yields are described as less than satisfactory and the purification of the products as difficult. Ring-closing agents employed include zinc chloride, phosphorous pentachloride, aluminum chloride, aqueous hydrobromic acid, hydrogen bromide in glacial acetic acid, and phosphorous pentoxide in tetralin or cymene. With the latter, a yield of 44% is reported.

Uhlig discloses the use of PPA as a "new cyclization agent in preparative organic chemistry" and reports "surprisingly high cyclic compound yields." Uhlig teaches that all cyclization reagents, previously used, including phosphorous pentoxide, are "surpassed by PPA in many respects."

Brockmann et al. disclose the use of PPA in the preparation of acridones.

The DuPont patent discloses a preparation of a quinacridone in which the reagents are diluted with water. The Struve patent teaches a process for the preparation of quinacridones from esters. Our resolution of this case renders consideration of the latter two references unnecessary.

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The only issue is whether the improved process as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made by appellant.

The examiner summarized his rejection of appellant's claims as follows:

All the claims stand rejected as unpatentable over Liebermann and Struve, of record, in view of Uhlig and the British Du Pont patent. The basis of the rejection is 35 U.S.C. 103. It is considered that *a chemist of ordinary skill would be led* by the Uhlig reference *to try polyphosphoric acid* in the cyclization process of Liebermann, since the cyclization reagents used by Liebermann, though operative, leave much to be desired, and since Uhlig states that P.P.A. has been found to offer many advantages over other previously used reagents. The mere fact that the results to be obtained are not absolutely predictable does not make its successful use unobvious. In re Wietzel et al., 400 O.G. 463, 5 USPQ 177. In re Moreton, 129 USPQ 288.

It being considered *obvious to try* P.P.A. in the cyclization step, it is further

considered obvious to treat the resulting acid reaction mixture in the conventional manner, i.e. by dilution with water, to obtain the product in pigmentary form. The British Du Pont patent is cited to show that the step is in fact obvious to the chemist of ordinary skill. [Emphasis ours.]

The board agreed with the examiner.

The stated position of the examiner is that a chemist would be led by the Uhlig reference to utilize polyphosphoric acid in the cyclization process of Lieberman[n], in place of the cyclizing reagents disclosed by Lieberman[n] since the reagents of Lieberman[n], although operative, leave much to be desired and Uhlig states that polyphosphoric acid has been found to offer many advantages over previously utilized reagents. \* \* \*

\* \* \* We are in full agreement with the examiner's view that the fact that Lieberman[n]'s cyclizing reagents were not entirely satisfactory would be an incentive to one skilled in the art to use other cyclizing reagents in Lieberman[n]'s process as they become available, and in view of the Uhlig disclosure we are of the opinion that it would be obvious to a chemist to use polyphosphoric acid in that reaction, since Uhlig specifically teaches that polyphosphoric acid is a cyclizing reagent in organic chemical reactions.

[1] It is seen that the board's conclusion is built on the unsatisfactory nature of the Liebermann process and the enthusiastic tenor of Uhlig's report. But the mere existence of an unsatisfactory process and the attendant incentive to seek improvement do not negative patentability. We think that one cannot fairly infer obviousness from the inadequacies of the prior art. The issue here is whether the elimination of those inadequacies by the means disclosed by appellant would have been obvious to one of ordinary skill-whether the Uhlig disclosure would have made it *obvious* that the substitution of PPA for phosphorous pentoxide would change a generally unsatisfactory process into an excellent one.

We do have, on the one hand, Uhlig's comments: "[C]yclization experiments with polyphosphoric acid \* \* \* [result] in surprisingly high cyclic compound yields. All reagents used hitherto for \* \* \* [cyclization reactions] such as  $\text{AlCl}_3$ ,  $\text{FeCl}_3$ ,  $\text{BF}_3$ ,  $\text{SnCl}_4$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_2\text{F}_2$ ,  $\text{P}_2\text{O}_5$ ,  $\text{HCOOH-H}_3\text{PO}_4$ , and  $\text{H}_2\text{SO}_4\text{-H}_3\text{PO}_4$ , and  $\text{H}_2\text{SO}_4\text{-H}_3\text{PO}_4$ , are surpassed by 'PPA' in many respects." On the other hand we have the countervailing considerations which would influence one of ordinary skill in the art in his evaluation of this intelligence. The generality of Uhlig's disclosure indicates the inappropriateness of literalism in its reading - the quotations relied on are but parts of the first two sentences of an article which later discusses the merits of PPA in detail, never referring to processes analogous to appellant's invention. Furthermore, the "surprisingly high" yields reported in the body of the article seem to be increases on the order of 15-25%-considerably less than appellant's increase of more than 100%. A skilled worker in the art would also be aware of the chemical similarity of PPA and phosphorous pentoxide and might well infer that the special problems in the Liebermann process

would recur when PPA was used. He certainly would be cognizant of the extra difficulty associated with closure of the second ring in double-ring closure reactions and would not assume that the Uhlig catalogue of successful *single* -ring closures presage success in *double* -ring closure. He would note that the only reactions involving five-ring compounds reported by Uhlig were not dehydration reactions, as are those of the invention. Nor from them would he derive an expectation of such increased yields since the yields reported in the

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preparation of five-ring compounds average *less than* those of the old Liebermann process <sup>2</sup>.

In the face of these considerations we conclude that only illusory support for the board's position can be derived from the Uhlig article.

The board felt "strengthened" in its view by the disclosure of Brockmann et al. that acridones had been successfully synthesized with PPA. That synthesis too involves single-ring closure. Appellant protests again that the problem is in the second ring closure and points out that several reagents effective for single-ring closure are ineffective for double-ring closure. This rebuttal seems convincing to us. The solicitor does not rely heavily on Brockmann et al.

We therefore reverse the rejection of claims 1-10. The solicitor concedes that such a reversal is dispositive of the appeal as to all claims. Accordingly the rejection of claims 1-19 is *reversed*.

### **Footnotes**

Footnote 1. Consisting of Duncombe, Examiner-in-Chief, author of the opinion, and Behrens and Wyman, Acting Examiners-in-Chief.

Footnote 2. The solicitor points to the reported preparation of 3 $\phi$ , 4-diketo-1, 2, 3, 4-tetrahydro-1, 2-cyclopentenophenanthrene and 3 $\phi$ , 4-diketo-7-methoxy-1, 2, 3, 4-tetrahydro-1, 2-cyclopentenophenanthrene. Yields are reported as about 60% and 20% respectively.

### **Concurring Opinion Text**

#### **Concur By:**

Smith, Judge, concurring.

The examiner, in applying section 103, cast his inquiry in terms of "obvious to try." The board while not using this terminology has employed the rationale of the examiner's statement in analyzing the issue presented under section 103. The solicitor abjures it here.

There is, of course, nothing in the statute which permits application of such a test. In re Tomlinson, 53 CCPA 1421, 363 F.2d 928, 150 USPQ 623 (1966); In re Henderson, 52 CCPA

1656, 348 F.2d 550, 146 USPQ 372 (1965); In re Huellmantel, 51 CCPA 845, 324 F.2d 998, 139 USPQ 496 (1963); see In re Fay, 52 CCPA 1483, 347 F.2d 597, 146 USPQ 47 (1965). It not only involves an analysis for which there is no authorization but it precludes a consideration of the invention as a whole for which there is an explicit statutory directive.

Considering the subject matter as a whole in view of the prior art of record, I agree with the majority that the claimed invention is unobvious.

### **Dissenting Opinion Text**

#### **Dissent By:**

Worley, Chief Judge, dissenting.

Viewing the references relied upon, particularly the Uhlig disclosure that yields of 90-99% may be obtained and "no undesired secondary reactions need be feared" when polyphosphoric acid is employed in place of, e.g. phosphorous pentoxide, as a ring closing agent in analogous reactions, I am satisfied the board has considered the subject matter as a whole and committed no reversible error in rejecting the claims. I would affirm.

Footnote \* Senior District Judge, Eastern District of Pennsylvania, sitting by designation.

**- End of Case -**